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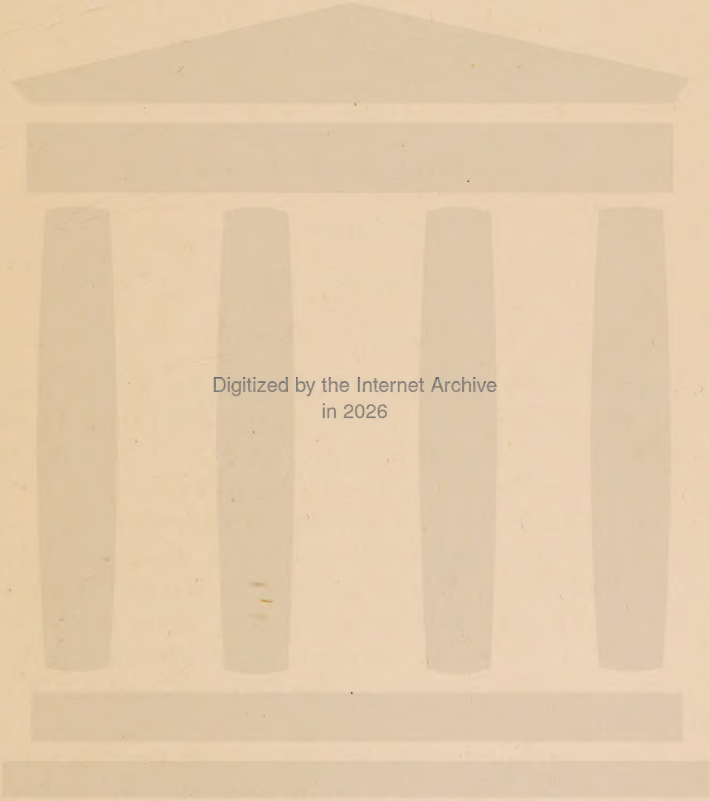
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IX.

INJURIOUS INSECTS AND OTHER ANIMALS OBSERVED IN IRELAND DURING THE YEAR 1913.

By GEORGE H. CARPENTER, M.SC., M.R.I.A., F.E.S.; Professor of Zoology in the Royal College of Science for Ireland, and Consulting Entomologist to the Royal Dublin Society.

(Plate XIII.)

[Read May 26; Published July 31, 1914.]

CORN INSECTS.

The Frit-fly.

Oscinis frit (Linn.).

A crop of oats in Co. Tyrone suffered badly in May and early June from attacks by the maggots of this small black fly, already described in this series of papers (4, pp. 147–8; 5, p. 8). On the two former occasions of this insect's reported presence in Ireland—in 1901 and 1909, in both years in the Queen's County—it was the summer brood of maggots, feeding in June and July, that caused the damage. In this instance the maggots of the spring brood were feeding within the sheathing leaves and boring into the stems of the young oat-plants, which consequently drooped, so that extensive patches of the field appeared likely to fail altogether.

Since the Frit-fly was last noticed in Ireland, a valuable account of its life-history, with economic advice, has been published by MacDougall (8); and my assistant, T. R. Hewitt, working with the specimens here recorded, and with others kindly placed at our disposal by Dr. MacDougall, has made a study of the structure of the maggot and puparium (7).

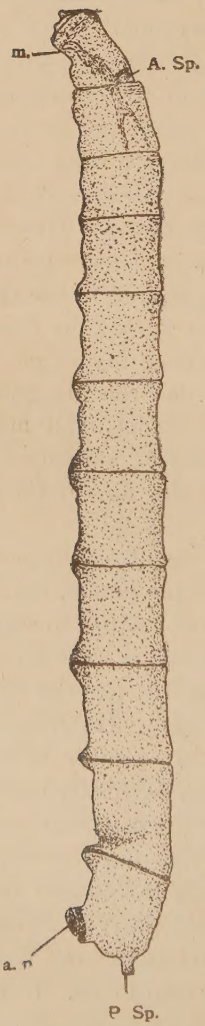
The earliest brood of flies are out in the spring; the females (fig. 4) lay eggs on the young oat-plants, and the maggots, when hatched, eat into the main shoot, which usually perishes.

MacDougall explains (8, p. 132) that the plant may survive if it produces healthy roots and if branches grow up "from the axils of leaves near the surface of the soil." The presence of the maggot causes the leaves to wither and the plant to droop; examination below the bases of the sheathing leaves shows the maggot eating the soft tissue of the shoot, which becomes brown and decayed. The insect itself being very small is not readily seen. When the maggot is fully grown it measures only about 3 mm. ($\frac{1}{8}$ inch) in length, and it pupates in the plant where it has been feeding. The flies of the second brood are on the wing about midsummer, and the maggots that develop from their eggs feed in July in the stems of grasses or in the ears of oats and barley, the grain in which naturally deteriorates. These larvæ pupate, and the puparia may be harvested, in which case swarms of the small black flies appear among the grain, as in the Queen's County in 1901 (4, p. 147). Such flies should be destroyed wherever possible. Their normal habit is to lay eggs on the stems of grasses or of winter oats, in which the maggots feed during the late autumn and early winter; MacDougall mentions that in England they may be active as late as December 19th. Ultimately they become transformed into the flies of the spring brood.

On account of the concealed feeding habit of the maggots, and the resting-place of the puparia within the plants, the farmer is restricted to preventive measures in his endeavour to fight this pest. MacDougall, like previous writers on this insect, advises early sowing "to get the plants, before the first issue of the flies, over their youngest, most dangerous, stage." He records that on experimental plots, oats not infrequently recover to a great extent from attacks of the summer maggots, especially oats of the "Hamilton" and "Potato" varieties. In the case now recorded from Co. Tyrone, the crop also made a very fair recovery from the damage inflicted by the spring maggots, despite the discouraging appearance presented by the field early in the season.

A few points with regard to the distinctive structural character of the Frit-fly maggot (figs. 1, 2) may be mentioned. It is very narrow in relation to its length, and smooth externally, except for a few minute spines arranged in rows across the segments close to

their front edges. The most prominent features are the tail



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spiracles (fig. 1, *sp.*), which open at the tips of tubular projections

at the hinder end of the body. Each spiracle has three circular openings with radiating thickened ridges of the cuticle between them. The pair of small front spiracles (fig. 1, *a*, *sp.*) are situated, as usual, on the sides of the thorax; each has four minute cylindrical branches, the extremity perforated like a sieve. The mouth-hooks (fig. 2) are powerful, and armed with strong teeth. The puparium (fig. 3) is brown, and tapers at the two ends; in it can be distinguished most of the distinctive features of the larval cuticle from which it is formed, and through it the outline of the pupa can be discerned, after suitable treatment. The drawings illustrating these points are taken from Hewitt's paper (7).

4

FIG. 1–4. (Frit-fly *Oscinis frit*).

1. Maggot, side-view, × 30. *m.* mouth; *A. sp.*, front spiracles; *P. sp.*, hind spiracles; *a.p.* anal proleg. 2. Mouth-hooks and pharyngeal skeleton, oblique side-view, × 60. 3. Puparium, ventral view, × 30 (outline of pupa visible). 4. Female fly, × 20.

(1–3 from Hewitt, Sci. Proc. R.D.S, vol. xiv.)

CABBAGE AND TURNIP INSECTS.

The Turnip "Fly."

Phyllotreta nemorum (Linn.).

These familiar insects (see 4, pp. 569–570, pl. l) were exceptionally abundant in the dry spring of 1913. Young cabbage-plants in Co. Dublin gardens were devoured by the insects as soon as they appeared above ground, and were, in many cases, killed outright.

The Cabbage Aphid.

Aphis brassicae Linn.

Cabbage-leaves infested with these "greenfly" were received from Co. Waterford in September; an illustrated account of the species has already been given (4, pp. 321–6). In the case now recorded it is noteworthy that many of the active, predaceous maggots of a Hover-fly (Syrphus) were among the aphids, which they impaled on their mouth-hooks and devoured.

POTATO INSECTS.

Blackfly Grubs.

Bibionidae.

PLATE XIII, A.

Potato tubers from Co. Meath were received in February, hollowed out to a great extent by the grub of a species of Bibio—a group of which the black hairy St. Mark's Fly (*Bibio marci*) is the best-known member. Their flies are indeed often noticed in large numbers around the blossoms of fruit-trees which they are sometimes wrongfully accused of harming. The grubs, however, are known to feed on various kinds of roots and underground plant structures. They resemble somewhat in appearance the well-known "leather-jacket" grub of the "Daddy-long-legs" (*Tipula*), but are smaller, more slender, and distinctly spiny. Unlike the Tipula grubs, they have paired spiracles on most of the abdominal segments. They have been occasionally recorded

as injurious. Ormerod (11, pp. 56–57) and Theobald (17, 1910, pp. 96–97) describe the larvæ of *Dilophus febrilis*, the "Fever fly," as harmful to the roots of hops. It may, however, be open to doubt if they are able to start damage to a previously uninjured plant-tissue. The grubs seem to be but little affected by the dressings usually applied for killing or repelling underground insects. Various birds, however, including domestic poultry, devour them readily.

ORCHARD INSECTS.

The Migratory Apple Aphid.

Aphis Fitchii, Sanderson.

An account, with figures of the Common Apple Aphid (*Aphis pomi* De Geer), was given four years ago in this series of papers (5, pp. 12–15), and last year (*ib.*, pp. 84, 85) the Rosy Apple Aphid (*A. sorbi*, Kalt.) was recorded both from the north and south of Ireland. In October, 1913, examples of the third species of Aphis known to infest the apple in Great Britain and in North America were received from Co. Galway. This species is *Aphis Fitchii*, Sanderson (16), which was for many years confused with *A. pomi*. The male of *A. Fitchii* is—like the same sex in *A. sorbi*—winged, and the winged virgin females—again like the corresponding forms of *A. sorbi*—migrate in summer to grasses, a subsequent generation of winged female migrants returning in autumn to the apple, where they give birth to the sexual aphids. In colour the virgin wingless and winged females of *A. Fitchii* are green or yellowish-green, with black markings, somewhat like those of *A. pomi*, but they may be distinguished at a glance from members of the latter species by the short, stout cornicles (figs. 5, 6), which contrast markedly with the long, slender cornicles of *A. pomi*. The winged male of *A. Fitchii* has a light yellowish-brown abdomen, while the wingless female is described by Sanderson (16, p. 146) as "yellowish-green to dark greyish-green, and in older specimens quite blackish . . . legs darker than body."

The hard winter eggs laid by these females are hatched

usually in the month of April. In their mode of life the virgin females of *A. Fitchii* differ somewhat from those of *A. pomi*, not only by their migrations from and back to the apple, but also by

Fig. 5.—*Aphis Fitchii*, wingless virgin female. × 25.

their habit of attacking flower-buds and blossoms, as well as foliage in the spring, and by their presence in numbers on the leaves not causing these to curl. There are several generations of

Fig. 6.—*Aphis Fitchii*, winged virgin female. × 25.
(From Sanderson, 13th *Report Delaware Coll. Agri. Station.*)

virgin females on the fruit-trees until mid-summer; the autumn winged migrants return in October, during which month and in November the males and females—offspring of those migrants—

pair, and the eggs are laid. Strong spraying in autumn, as suggested for *A. pomi*, would therefore be an effective method for preventing the ravages of this species also.

The Woolly Aphid.

Schizoneura lanigera (Hausm.).

In the last paper of this series (5, pp. 85–9) reference was made to Miss Patch's discovery (12) that the normal host for the sexual forms and the spring virgin "stem-mothers" of this insect is the elm. Late last year two further papers (13, 14), by the same authoress, were published, embodying the results of detailed study of the North American species of Schizoneura on the elm, which are distinguished by their occurrence and effect on the tree, and by the relative length of the antennal segments. Miss Patch now admits that the true *S. ulmi* Koch, which causes the ordinary "leaf-curl" on elm, has as its alternate form the root-sucking colonies on currant, &c., known as *S. fodiens*, and has nothing to do with *S. langiera*. The spring forms on elm of *S. langiera* have hitherto been referred to *S. americana*, Riley. Only in the Southern States do these cause "leaf-curl"; usually they occur in masses on terminal "rosettes" or "leaf-clusters" on the elm-shoots. The true *S. americana*—which, like *S. ulmi*, incites "leaf-curl"—has hitherto been found on no plant except the elm. These valuable additional observations by Miss Patch should facilitate the endeavours of British and Irish naturalists to trace *S. langiera* to the elm in these islands.

The Furze Mealy-bug.

Pseudococcus aceris Signoret.

At midsummer apple shoots from Co. Armagh were found to be covered with ovisacs of this species, the females, eggs, and larvæ being numerous. The genus, Pseudococcus, to which it belongs, is nearly allied to Dactylopius, which includes the well-known "mealy-bugs" of greenhouses. Insects of this group form a sub-family of the Coccidæ, but their females are usually less degraded and more active than those of the typical scale insects. The female

(fig. 8) of Pseudococcus has feelers with nine segments and well-developed legs; the body is oval in shape, the segmentation, as is usual in this group, being clearly apparent, pale green or brown in colour, with a mealy covering due to waxen secretions from skin-glands, which grow into short prominences at the sides and behind. She is active through most of her life, but before the eggs are laid the waxy secretion forms an ovisac which completely envelopes the insect and her eggs. The adult female is from 2 to

7 8

Figs. 7, 8. *Pseudococcus aceris.*
7. Larva, dorsal view. × 70. 8. Female, ventral view. × 30.

4·5 mm. ($\frac{1}{12}$-$\frac{1}{5}$ inch) in length. According to Newstead (10, vol. 2, pp. 176–182), *P. aceris* is the only species found in our islands, though it is variable and may occur on a variety of food plants, being commoner on furze, elm, laburnum, lime, and hawthorn than on apple, plum, or rowan. It will be of interest to see if it may become harmful to fruit-trees in other parts of Ireland. According to Newstead, the ovisacs are formed on the shrubs or trees during May, and the larvæ are hatched in June. The larva (fig. 7) is a bright yellow insect of oval form, its segments

bearing stout spines, surrounded by waxy growth. The female insects undergo comparatively slight change in the course of their growth; they pass the winter in cracks of bark and between forks of the branches, sheltered only by their slight waxy secretions; like all female Coccidæ, they never acquire wings. They become ready for pairing in the spring of the next year. The male larvæ pass into a pupal stage by autumn, the pupæ being protected by firm felted scales. From these the tiny brown two-winged males, with ten-segmented feelers and hairy legs, come out in April and proceed to mate with the females, which then surround themselves with the waxy secretion and lay their eggs, thus completing the yearly life-cycle.

As the larvæ and females are but feebly protected, they may be more readily reached by washes—such as quassia or paraffin emulsion or nicotine—than the true scale insects. The whitish ovisacs are conspicuous, so that in small orchards they may be brushed off the trees on which they have established themselves.

The Clay-coloured Vine Weevil.

Otiorrhynchus picipes, Fab.

An illustrated account of these beetles has been already given in this series of papers (4, pp. 579–81). In May specimens of the small pale species (*O. picipes*) were sent from Co. Tyrone, where they had been feeding on the bark of apple-tree shoots and of currant bushes. One of the large Ground Beetles (*Carabus nemoralis*) was found among them, and was devouring them to such an extent as to lessen their numbers; fragments of their bodies and legs were found lying about beneath the trees.

The Winter Moth.

Cheimatobia brumata (Linn.).

The destructive caterpillars of this moth have been several times referred to in this series (4, pp. 329–331, Pls. xxvii, xxviii). They are notorious mostly for the damage that they do to apple-foliage, but they have been recorded (4, p. 576) as feeding on gooseberries, and in May and June of 1913 they were abundant in Co. Tyrone on black-currant bushes, eating the leaves and

destroying the buds and blossoms; indeed it was stated that they destroyed the flowers more than the foliage. The affected bushes were planted in an apple orchard so as to occupy most of the ground between the trees, which, having been carefully grease-banded through the winter, were almost free from caterpillars. It would be difficult, if not impossible, to grease-band currant bushes effectively, and spraying with arsenate of lead, unless done very early in the season, would render the fruit useless.

The Eyed Hawk-Moth.

Smerinthus ocellatus (Linn.).

Late in August the large caterpillars of this moth were received from Bantry, Co. Cork, where they were devouring the foliage of apple trees. Similar damage by this species has been previously mentioned in this series of papers (4, pp. 578–579, 602; 5, p. 44). It seems to attact attention in the south and south-west of Ireland more frequently than in the north.

GARDEN PESTS.

Bulb Eelworms and Mites.

Tylenchus devastatrix, Kühn, and *Rhizoglyphus echinopus* (Fourn.).

PLATE XIII, B.

Complaint is often made of the damage done to narcissus and other bulbs by the minute Nematode worms whose ravages in oats and other farm crops have been already described in this series (4, pp. 285–288, fig. 2; p. 568). By direction of the Department of Agriculture experiments have been carried on during the past two years with a view of studying the method by which bulbs become infected with the eelworms, and determining the most hopeful mode of treatment. An account of this work has been lately published by Hewitt (6). A piece of ground at the Royal Botanic Gardens was used for the experiments, small plots being planted with bulbs, all the bulbs being healthy in one plot, all infected with worms in another, while in eighteen plots healthy and infected bulbs were mixed, some having been soaked in various solutions in order that it might be seen if these would kill the worms or prevent their migration into healthy bulbs.

These experimental plots were planted in October, 1912 ; some of the bulbs were lifted in March and April, 1913, and the remainder in November, 1913. It was found that during the winter and early spring no migration had taken place, but that in the summer months worms made their way from infested bulbs to healthy ones, entering, as is stated by Reh (15, p. 24) and other Continental writers, by the crown of the bulb and working down to the base. As regards the vermicides used, the best effects were obtained with 5 and 7½ per cent. solutions of copper sulphate, in which the bulbs had been soaked for seventeen hours ; this treatment killed all or nearly all the worms, and did not hurt the bulbs, while healthy bulbs treated in this way were protected from the incursion of eelworms, and also of millepedes and insect pests Formalin does not kill the worms so quickly as copper sulphate, nor does it protect healthy bulbs. The other substances tried were cresylic acid, paraffin, and hot water (120° F.). Both the last-named kill the bulbs as well as the worms, while the cresylic acid does not penetrate.

Root-mites were present in many of the bulbs ; these little pests have been described and figured in this series (4, pp. 258–260). Often eelworms and mites were found in the same bulb ; but many had either worms or mites only. It may be inferred from this " that either can injure the bulbs independently, and that neither is present simply as a follower of the other." The copper sulphate solution was more fatal to the mites than to the worms.

The Spotted Snake-Millipede.

Blaniulus guttulatus (Bosc).

The ravages of these small, slender, pale, pink-spotted millipedes in various plants have been several times mentioned in this series of papers (4, pp. 434, 441, 539, 602 ; 5, pp. 11, 22). At midsummer, complaints were received from Co. Cork of the damage done by them to strawberries ; while in Co. Dublin they were eating the roots of runner beans. As mentioned above, copper sulphate solution acts as a repellent to these creatures ; but no dressing of such a nature could be applied to strawberries or any edible part of a plant. Burning all refuse and dressing

infected ground heavily with salt and soot in the autumn has been found, in some cases, to clear the soil of Blaniulus.

Springtails.

Achorutes armatus (Nicolet), and *Lipura armata* Tullb.

Springtails of various kinds are constantly found to cause damage to various garden plants. *Achorutes armatus* was first recorded as harmful in Ireland in 1904, when it was described and figured in a paper of this series (4, pp. 251–2), having been observed feeding on beans in the soil. In July, 1913, specimens, received from Co. Wicklow, were noted to have behaved in just the same manner.

In 1904, and in several subsequent years (4, pp. 251–253, 293–294, 298, 340, 442), a common white species of the springless, blind genus Lipura—*L. ambulans* (Linn.)—was recorded as destructive to plants of divers kinds. In July, 1913, many specimens of another common white species—*L. armata* Tullberg—were received from Co. Dublin, where they were present in large numbers infesting a greenhouse carnation-bed, and allowed themselves to be trapped in pieces of orange-peel, potato, and carrot. *L. armata* is included in the list of British springtails harmful to vegetation, lately published by Theobald (17, 1910, pp. 111–127). It resembles *L. ambulans* in having a pair of spines at the tail-end, but differs from that species in the structure of the post-antennal organ, which has over thirty simple prominences instead of about fourteen complex ones.

Wireworms.

Agriotes lineatus (Fab.), &c.

The same greenhouse carnation-bed that harboured the springtails just mentioned was found to be terribly infested also with those well-known pests, the wireworms or grubs of click-beetles. The soil with which the bed was made in 1912 had been taken from an old pasture unbroken for twenty years; and there can be little doubt that the insects had thus been introduced into the garden, as undisturbed grass-land is well known to be a nursery for wireworms and other root-eating grubs.

Vine Weevil Grubs.

Otiorrhynchus sp.

Damage by one of these beetles to bark of fruit-trees has been mentioned already in this paper (p. 151). In November the white, legless, brown-headed grubs were received from Co. Waterford, together with cyclamen plants, whose underground parts they were injuring. The tubers were eaten out into cup-shaped cavities.

The Turnip Moth.

Agrotis segetum Schiff.

This common insect has been already described and figured in this series (4, pp. 432–4). In September, 1913, caterpillars were sent from Co. Wicklow, where they had caused much damage to lettuces in a garden, sometimes biting the head off close to the ground—the characteristic habit of such surface caterpillars—and sometimes eating into the heart of the plant.

The Fern Scale-insect.

Chionaspis aspidistrae Signoret.

In March specimens of filmy ferns were received from the Royal Botanic Gardens, Glasnevin, the fronds bearing the brown female scales of this insect which is allied to the common *Chionaspis salicis* (Linn.) of the willow, ash, and other native trees. According to Newstead (10, vol. i, pp. 187–190), *C. aspidistrae* has a wide distribution in the Tropics, while in England it has been found in the Royal Botanic Gardens, Kew, and in Cheshire. The female of this species is yellow in colour, with exceedingly prominent lateral lobes to the abdominal segments. The scale may attain a length of 3 mm., and is shaped like a small mussel-shell; it varies in colour from yellowish to a darker brown. The male scale, beneath which the pupa is sheltered, is white. The fully developed male is yellow, with black eyes, long legs, and feelers, and relatively large whitish wings.

The Rose Sawfly.

Blennocampa pusilla Klug.

Curled-up rose-leaves, harbouring the larvae of this sawfly, were received from Londonderry in July. The sawfly measures

about 4 mm. ($\frac{1}{6}$ inch) in length; it is black, with the shins and feet whitish and the wings dusky. According to Cameron (3, pp. 253–254) and Theobald (17, 1909, pp. 79–80), there are two broods in the year, one set of caterpillars feeding in April and a second in June and July. The wintering stage is the full-fed larva in its underground cocoon, as in many insects of this family. The caterpillar is green, with a brown and white head. The leaves on which these caterpillars feed are always tightly rolled lengthwise, so that the insect obtains shelter as well as food. This rolling is due to a reaction of the plant to the irritation caused by the female fly, which cuts slits just below the edges of the leaves, and lays her eggs therein. On account of this leaf-rolling habit, spraying is of little use, but the curled leaves are easily seen, so that they can be picked off and burned with the contained larvæ.

FOREST INSECTS.

The Giant Willow Aphid.

Lachnus viminalis Fonsc.

Willow shoots from Co. Wicklow, gathered in September, were found to be covered with colonies of these aphids, which, on account of their large size, predominantly dark colour, and great numbers, are very conspicuous when feeding. The genus Lachnus is readily distinguished from Aphis and its immediate allies by the short feelers and cornicles, the heavy build of the body, and the long slender legs and beak. A very full account of this species and its habits is given by Theobald (17, 1905, pp. 92–97). The vast majority of members of a colony are wingless virgin females. One of these insects measures about 5 mm. ($\frac{1}{5}$ inch) in length. The somewhat globular body is brown, with fine grey hairs and large black spots; a prominent tubercle is conspicuous on the back. The long legs are brown, with the thighs and shins partly red. There are also virgin females which are about the same size as the wingless insects, but possess whitish wings of fair size, so that when expanded they measure 15 mm. ($\frac{3}{5}$ inch) across from tip to tip. These virgin females are found in summer and autumn. Egg-laying females are said to appear in November. The large communities that are seen on the trees are founded by

winged females which migrate from their parent colony to some unoccupied shoot or branch.

Theobald remarks that the wingless Lachni are always found with their heads upwards. They cover the branches and shoots, sucking sap through the bark, which becomes marked with a reddish stain. The effect of their action varies greatly in different cases, sometimes causing the death of the tree, and sometimes doing apparently little damage. The leaves are never sucked directly by the aphids, but may be affected by the loss of sap from the shoots. However, the leaves are usually much disfigured by the heavy secretion of "honey-dew," from the insects' intestines, which flows copiously. This substance is sought after as food by wasps which often congregate in numbers on the trees infested with the Lachnus.

On low trees in small plantations these insects can be crushed and killed by a gloved hand. For their destruction on a large scale, spraying with quassia and soap-wash may be recommended.

The Giant Spruce Aphid.

Lachnus piceae Walker.

In September specimens of Lachnus from spruce were received from Co. Kildare. According to Buckton (2, vol. iii, pp. 58–9), this species, found both on spruce and on silver fir, is distinct from *L. viminalis*. Theobald suggests, however, that it may really be identical with the willow-feeding kind. Mr. F. Howard, to whom I am indebted for these conifer-Lachni, informs me that they were surrounded by crowds of wasps, as mentioned above in connexion with *L. viminalis*.

The Soft Brown Scale.

Lecanium capreae (Linn.).

This species has been twice mentioned in this series (4, p. 441; 5, p. 17) as occurring on the bark of apple-trees. In May Sir Frederick Moore found, and kindly sent to me, exceptionally large specimens, from horse-chestnuts in Co. Waterford, which were present in such numbers as to constitute a pest.

STOREHOUSE PESTS.

The Cheese Mite in Wheat.

Tyroglyphus siro (Linn.).

This well-known mite, previously mentioned in this series (5, p. 23), is a common "messmate" of mankind, feeding on cheese, meal, hay, and other substances. In March, 1913, a sample of wheat infested with these creatures was received from Co. Cork; they were eating out the interior of the grains and attacking the embryo. Fumigation with carbon bisulphide might be tried in bad cases of the kind.

The Rice Weevil.

Calandra oryzae (Linn.).

This little beetle—highly destructive to stored grain—has been described and figured in this series (4, pp. 341–343). In April a sample of maize infested with the insects was received from Co. Kilkenny. The sample had been taken from a lot offered to my correspondent for grinding. It is hardly necessary to record that he was advised to refuse the consignment.

ANIMAL PARASITES.

The Ox Warble-fly in a Horse.

Hypoderma bovis (De Geer).

The occasional presence of warble-maggots in horses, and even in human beings, is well known, but there has been considerable doubt as to the identity of these parasites. Neumann (9, pp. 55–56), quoting Joly's observations of 1849, states that the species of larva found beneath the skin of horses must be distinct from the cattle species on account of its small size and smooth cuticle. Brauer (1, p. 138) had, however, long before pointed out that this description must evidently refer to a young Hypoderma larva in the second stage. It was with much satisfaction, therefore, that in May, 1913, I received through the kindness of Mr. James Doyle, M.R.C.V.S., of Monkstown, Co. Dublin, a mature (fourth-stage) warble-maggot, which he had himself extracted from the back of a thoroughbred mare. This larva agrees exactly

with the corresponding stage of our common Irish species of Ox-Warble (*H. bovis*), and we have lately found that the distinctive characters of the larva of *H. bovis* and our other cattle-species (*H. lineatum* Vill.) are confirmed by rearing the flies. We may be confident that the horse warble-maggot now recorded had developed from an egg laid by *Hypoderma bovis*. Further observations on these parasites in horses would be very welcome, for it is of course possible that a second species may occasionally find a host in that animal.

REFERENCES.

1. Brauer, F.—Monographie der Oestriden. Wien, 1863.
2. Buckton, G. B.—Monograph of the British Aphides, vol. iii. London (Ray Society), 1881.
3. Cameron, P.—Monograph of the British Phytophagous Hymenoptera, vol. i. London (Ray Society), 1882.
4. Carpenter, G. H.—Injurious Insects and other Animals observed in Ireland. *Econ. Proc. R. Dublin Soc.*, vol. i., 1902–9.
5. —— *Ib.*, vol. ii., 1910–13.
6. Hewitt, T. R.—Eelworms in Narcissus Bulbs. *Journ. Dept. of Agric. and Tech. Instr. Ireland*, vol. xiv., no. 2, 1914.
7. —— The Larva and Puparium of the Frit-fly. *Sci. Proc. R. Dublin Soc.*, vol. xiv., 1914, pp. 313–316, pl. xxvii.
8. MacDougall, R. Stewart.—Insect Pests in 1911. *Trans. Highl. Agric. Soc. Scotland* (5), vol. xxiv, 1912, pp. 120–138.
9. Neumann, A.—A Treatise on the Parasites and Parasitic Diseases of the Domesticated Animals. (Transl. G. Fleming.) London, 1892.
10. Newstead, R.—Monograph of the British Coccidae, 2 vols. London (Ray Society), 1900–2.

11. Ormerod, E. A.—Report of Observations of Injurious Insects, &c., during the year 1884. London, 1885.

12. Patch, Edith M.—Elm Leaf Curl and Woolly Apple Aphid. *Maine Agric. Exp. Station Bulletin* 203, 1912.

13. —— Woolly Aphids of the Apple. *Ib.* 217, 1913.

14. —— Woolly Aphids of the Elm. *Ib.* 220, 1913.

15. Reh, L.—Sorauer's Handbuch der Pflanzenkrankheiten. III. Band. Die tierischen Feinde. Berlin, 1913.

16. Sanderson, E. D.—Report of the Entomologist in *13th Ann. Report Delaware Coll. Agric. Exp. Station*, 1902.

17. Theobald, F. V.—Reports on Economic Zoology, 1905, &c.

EXPLANATION OF PLATE XIII.

A. Larvae of Bibio feeding in Potato.

B. Narcissus Bulbs cut open to show injury by Eelworms (*Tylenchus devastatrix*).

Photographs by T. Price.

A

B

M'Farlane & Erskine.

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